King County Reclaimed Water Assistance Program

Subtask 510 – Selection and Evaluation Criteria

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DATE: May 5, 2000

REVISED DATE: May 14, 2000
July 24, 2000

Background

King County Department of Natural Resources (KCDNR) solicited project nominations from potential reclaimed water users in King County to evaluate the region's need and ability to support water reclamation demonstration plant(s). With a response from 11 different applicants representing 13 projects/areas within King County, KCDNR performed an initial screening. Projects considered ongoing with another portion of the Reclaimed Water Program, such as those with the City of Tukwila and the University of Washington, were removed from the process. Those projects representing uses other than landscape irrigation or commercial/industrial process were removed to be considered in a later phase of the Reclaimed Water Program. The remaining applications were grouped into five potential reuse projects that each included a satellite treatment facility and application site(s). More details on the project nomination and initial screening process is presented in Technical Memorandum 420.

A subsequent evaluation process was established to rank the five potential reuse projects and determine which projects were generally favorable and should be moved forward to a feasibility stage. This technical memorandum describes the ranking process that was established and the results for each of the five projects.

Summary

After conducting the evaluation process on the five potential reuse projects, the projects were given a numerical ranking based on the overall rankings applied in each category. The Sammamish River project received an overall favorable ranking of '1' which indicates that this project should be considered for the next stage, feasibility analysis, based on the evaluation results. The North Sammamish River project received a ranking of '2'. It would be a likely candidate for the future feasibility analysis if there are sufficient resources to consider a second project. Both the Newcastle and Covington reuse projects were overall ranked 3rd, although Covington requires additional wastewater before the project could be

implemented. Tam O'Shanter was ranked 4th which is a low priority for further reuse analysis by KCDNR at this time.

Evaluation Criteria

In November 1999, a workshop was held with KCDNR to determine the categories to be established to evaluate water reuse projects. Four major categories were defined:

- Regulations – water rights, environmental issues, permits, and associated plans
- Community/Stakeholder – impacts, local support, and stakeholder benefits
- Financial – costs and funding
- Other – coordination with KCDNR projects

A number of issues associated with each category were discussed at the workshop. These issues were then later distilled into common groupings within each category as presented in Table 1. This formed the criteria which were used as the basis for the evaluation process for each reuse project.

TABLE 1
Evaluation Criteria for Water Reuse Projects

Regulatory 40%	Community/Stakeholder 25%	Financial 25%	Other 10%
Consistent with GMA, RWSP and regional water plans	Long-term impacts to community	Potential for funding opportunities	Integration with other KC projects
Potential water rights to be offset or substituted	Local public and elected official support	Benefit/cost evaluation	
Enhances streamflows directly or indirectly	Benefits multiple stakeholders	Unit cost for reclaimed water produced	
Beneficial to water bodies identified as 'low flows' or with endangered salmon listings			
Liability or health issues			
Legal constraints			
Construction-related environmental impacts			
Permits			

Based on the number of criteria included within each category, weighting factors were applied as shown in Table 1.

Evaluation Ranking

Five water reuse projects were included in the evaluation process:

- Sammamish River
- North Sammamish River
- Newcastle
- Covington
- Tam-O'Shanter Golf Course

For each evaluation criteria shown in Table 1, definitions were developed that listed what represented a 'favorable - ●', 'neutral - ◐ ', or 'unfavorable ranking - ○'. In addition to the three rankings previously stated, a 'not enough information - ⊗' ranking was developed for those cases where available information was insufficient to make a determination. Representatives from the consultant team evaluated each of the five projects against the specific criteria and ranked each one. The information used to perform the evaluation was based solely on materials presented in the RFN and knowledge of local environmental conditions. The complete list of definitions used in the evaluation ranking is presented in Table 2.

A discussion of the evaluation ranking for each project is presented below. The specific ranking results are presented in Table 3 at the end of this section.

Sammamish River

The Sammamish River reuse project involves the construction of a satellite demonstration project in the vicinity of the existing KCDNR York Pump Station, located at the corner of Willows Road and 124th in Redmond. A number of potential irrigation sites are located to the north and south of the York Pump Station, as shown in Figure 1. In addition to the sites identified through the project nomination process, KCDNR has identified other potential users in the vicinity. At this time, the amount of reclaimed water that could potentially be delivered for irrigation uses is limited by the volume of wastewater that could be made available at the York Pump Station during the summer, estimated at 4.53 mgd.

Regulatory ●●●●●●◐◐

Within the regulatory category, the Sammamish River project ranked generally favorable. A number of the irrigation users currently have water rights and draw water from the Sammamish River or the groundwater table adjacent to the waterway. By replacing that need with reclaimed water, much of the water remains in the Sammamish River during the low flow period and the water rights could potentially be purchased or banked with the Department of Ecology. Keeping water within the Sammamish River is beneficial as a potential Endangered Species Act (ESA) mitigation because the waterway serves as a primary link between Lake Washington and Lake Sammamish for several migrating salmon species. The waterway is currently known for low flows, high temperatures, and low oxygen during the summer season. Replacing potable water with reclaimed water would be compatible with a number of local and regional planning documents.

TABLE 2

PHASE I PROJECT NOMINATION RANKING NOTES

Criteria	Favorable	Neutral	Less Favorable	Notes
REGULATORY - 40%				
Consistent with GMA, RWSP, and regional water plans	Meets all listed items	Meets 1 or 2 of listed items	Meets none of listed items	
Potential water rights (based on volume) to be offset or substituted	The application site(s) allows the potential opportunity to obtain water rights (>50%)	Between 20%-50% of the application sites offer the opportunity to obtain water rights	Application site has no water rights, or less than 20% of the sites offer an opportunity to obtain water rights	Cost to obtain water rights or volume of water available are not factors included in this evaluation
Enhances streamflows directly or indirectly	Commitment to returns flow to stream by elimination of surface water withdrawals	Substitution of reclaimed water implies that surface or groundwater would return to stream	Indication that potable water saved would be used to supply other demands rather than returned to stream	Assumed that purveyors would use "saved" water to meet other demands, unless otherwise noted
Beneficial to water bodies identified as 'low flows' or with endangered salmon listings	Returns flows to such identified streams and improves water quality to same streams	Return flows to streams not identified as "low flows" or endangered salmon listings	No perceived benefit to flows or endangered salmon listings	Incorporates salmon enhancement features; net water quality features
Liability or health issues	No perceived or identified liability or public health issues		Similar applications in other areas have experienced perceived liability or health issues with same applications	- Liability i.e. degradation of groundwater - Health i.e. exposure to wastewater, pathogens,
Legal constraints	No known legal constraints		Legal constraints have been identified	Restricted uses
Construction-related environmental impacts	Little to no perceived environmental impact	Mitigation required to siting of facilities will be required	Severe environmental impact	Impact to wetlands, stream crossings, habitat, etc.
Permits	Does not require shorelines or Corps of Engineer 404 permit	Requires shorelines or Corps of Engineers 404 permit	High potential for permit denial.	

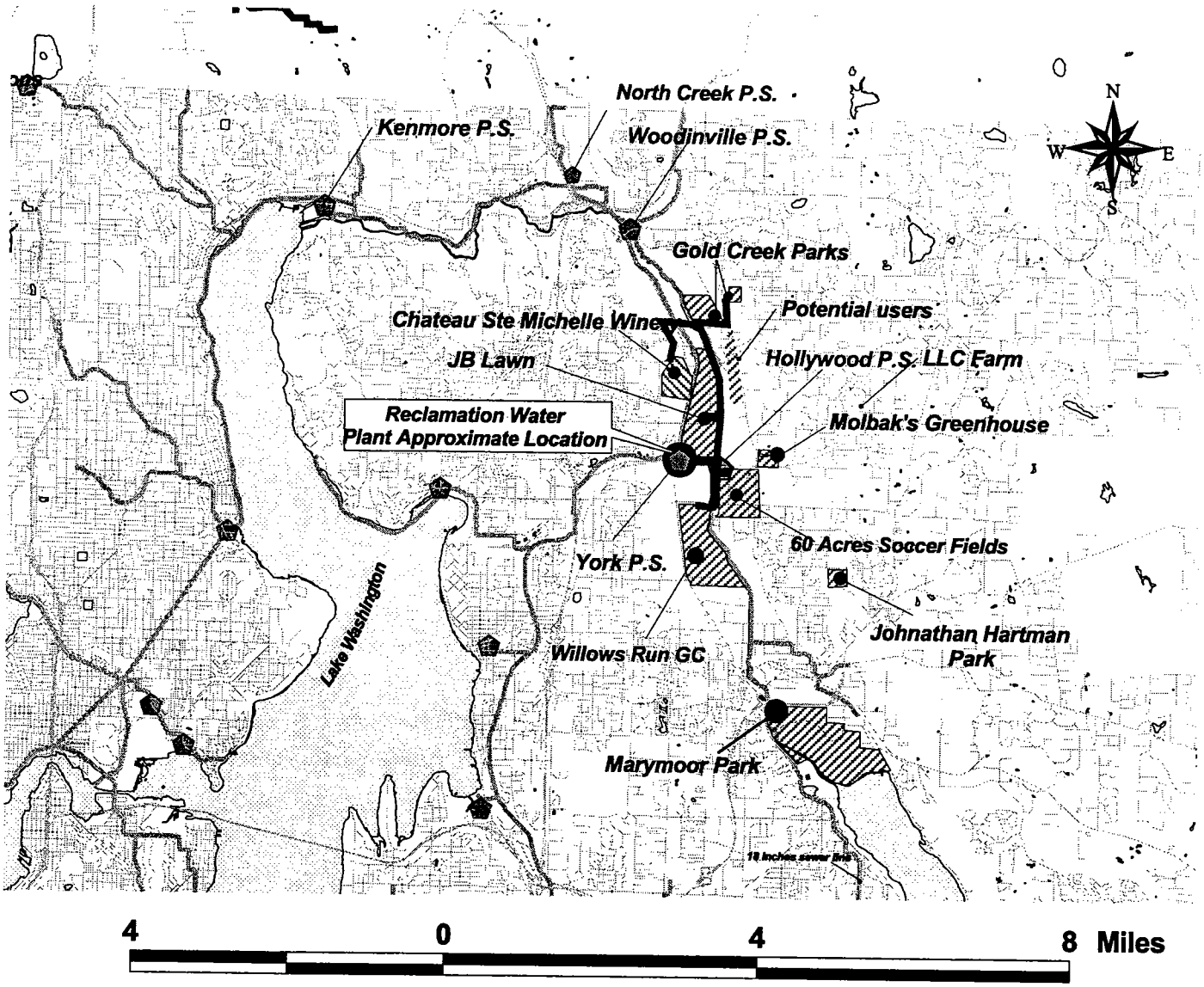
PHASE I PROJECT NOMINATION RANKING NOTES

Criteria	Favorable	Neutral	Less Favorable	Notes
Community/Stakeholder – 25%				
Long-term impacts to community where facilities are located	(1) reuse facilities and associated mitigation measures located within the community; (2) reclaimed water used within the community, replacing potable water; (3) 'freed up' water returned to fish locally or used for direct economic benefits	One or two of the measures listed under 'favorable' occur within the community	None of the measures cited under 'favorable' occur within the community	
Local public and elected official support	Appears to be greater support than opposition demonstrated by public and elected officials	No public/political opinion or mixed opinions have been expressed	There appears to be more opposition than support by public and/or elected officials	Meets regional water needs; willing customers; border disputes
Benefits multiple stakeholders	Benefits municipalities, interest groups, neighborhood groups and/or developers		Primarily benefits the user	
Financial – 25%				
Potential for funding opportunities	Multiple funding opportunities (up to 20%) identified through cost sharing, grants or loans	Single funding opportunity (0-19%)	King County sole financier	
Benefit/cost evaluation	B/C >X	B/C = X – X	B/C<X	The definition of 'benefit' in a financial sense is still being determined
Unit cost for reclaimed water produced	Unit cost <$5.00 ccf	Unit cost = $5.00-10.00/ccf	Unit cost >$10.00/ccf	
Other – 10%				
Integration with other KC projects	Portion of reuse project can be coordinated with KCDNR's CIP or Farm HCP	Reuse project can potentially be coordinated with future phase of KCDNR reclaimed water program	No relationship to any current or future KCDNR project; reuse project stands alone	

Note: Criteria categories and weighting developed in November 1999 King County workshop

Figure 1

Reclaimed Water Project Evaluation: Sammamish River



- Pumping Stations
- KC Sewers
- Streets
- Proposed reclamation Water Pipe
- User Area

Based on existing knowledge, there are no known health, liability or legal issues associated with using a Class A reclaimed water for irrigation uses. This project received neutral ratings in both the environmental degradation and permitting criteria. Because the irrigation sites are located primarily along the Sammamish River, shoreline permits would be required, river crossings would be included and wetland impacts would need to be identified. These environmental issues would require mitigation.

Community/Stakeholder ● ⊗ ●

The Sammamish River project was ranked as favorable in both the community at-large, as well as the 'benefit multiple stakeholders' category. The treatment facility will be located in the Redmond community and the irrigation sites are located in both Redmond and Woodinville. By eliminating summer season withdrawals from the Sammamish River and adjoining aquifer, and thus benefiting the river habitat, the communities of Redmond and Woodinville will be demonstrating a 'fish friendly' approach to the environment. The river walk will be greatly enhanced with greater flows and improved habitat for the enjoyment of the community. By providing reclaimed water, a number of stakeholders benefit from the project, namely the actual irrigation water users, the resident communities, as well as the environmental and interest groups that monitor the health of the Sammamish River. While the project was ranked as favorable to the community, no official survey has been completed and the actual level of local public and elected official support is not known.

Financial ⊗ ⊗ ●

A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the projects or users to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost ratio of this project is unknown. The estimated production cost of the project ranked 'favorable' with a unit cost of $4.01/ccf.

Other ●

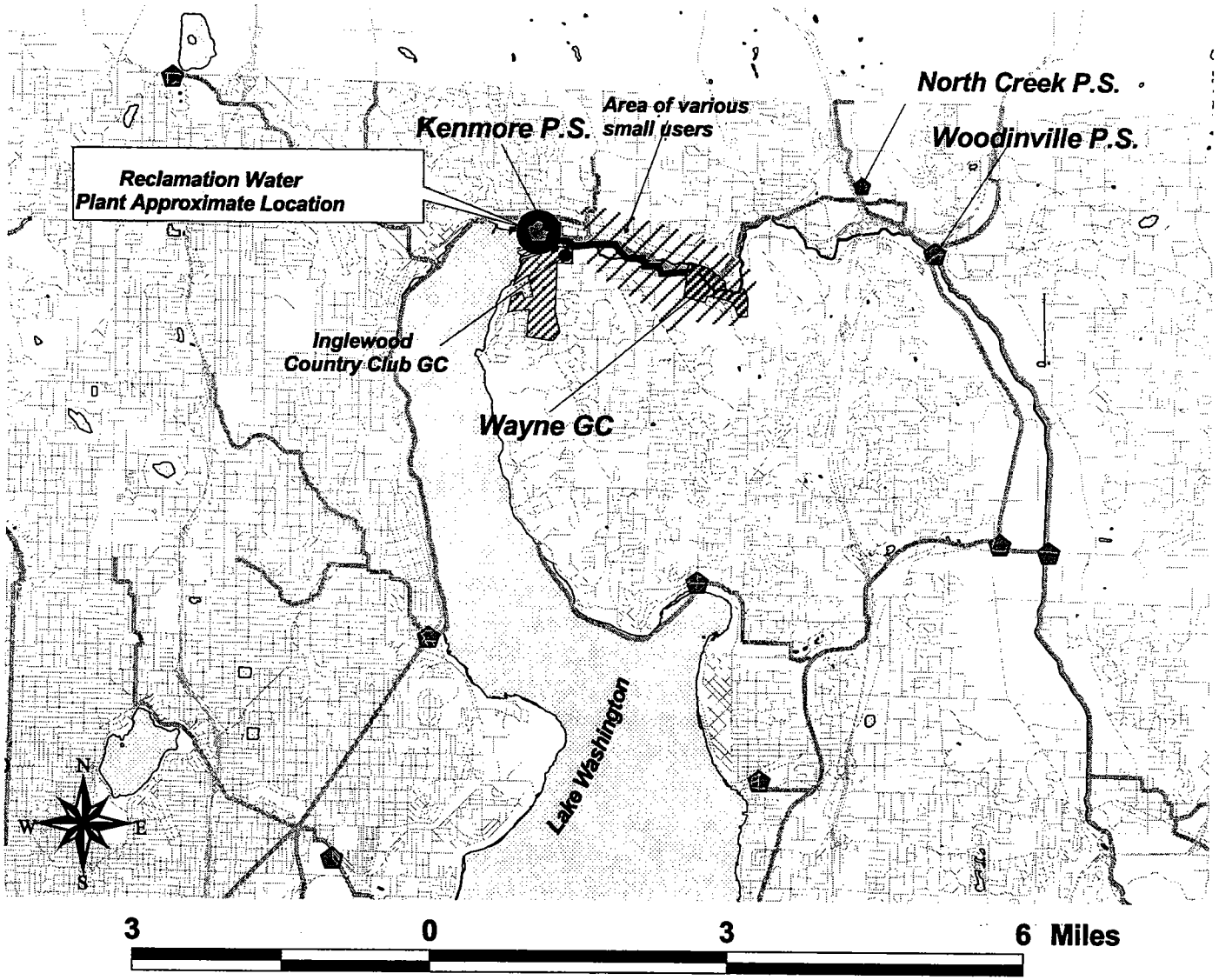
This project integrates with other KCDNR programs, namely the Farm Land Preservation Program. In addition, while the KCDNR Capital Improvement Program does not currently identify any projects that correspond to the Sammamish River Reuse Project, future phases of the KCDNR Reclaimed Water Program could include additional increments of reuse that could be added to this project site.

North Sammamish River

The North Sammamish River reuse project involves the construction of a 1.32 mgd satellite demonstration project in the vicinity of the existing Kenmore Pump Station. The majority of the irrigation sites identified in the RFN were primarily small, scattered users, so for this planning effort, the two golf courses located to the south and east of the proposed treatment facility were used to define the limits of the project, as shown in Figure 2. In addition to siting the satellite plant near the Kenmore Pump Station, the identified sites could also be potentially served by the proposed north treatment facility (which is still to be sited) or by an extension of the York Pump Station reclamation pipeline. For this evaluation, costs and ranking were based on treatment facilities near the Kenmore Pump Station.

Figure 2

Reclaimed Water Project Evaluation: North Sammamish River



- Pumping Stations
- KC Sewers
- Streets
- Proposed reclamation Water Pipe
- User Area

Regulatory ●●●●●●◐◐

Within the regulatory category, the North Sammamish River project ranked generally favorable. The two golf courses are believed to currently have water rights and draw water from the Sammamish River or the groundwater table adjacent to the waterway. By replacing that need with reclaimed water, much of the water remains in the Sammamish River during the low flow period and the water rights could potentially be purchased or banked with the Department of Ecology. Keeping water within the Sammamish River is beneficial as a potential ESA mitigation because the waterway serves as a primary link between Lake Washington and Lake Sammamish for several migrating salmon species. The waterway is currently known for low flows, high temperatures, and low oxygen during the summer season. Replacing potable water with reclaimed water would be compatible with a number of local and regional planning documents.

Community/Stakeholder ● ⊗ ●

The North Sammamish River project was ranked as favorable in both the community at-large, as well as the 'benefit multiple stakeholders' category. The treatment facility and irrigation sites are located in the Kenmore community. By eliminating summer season withdrawals from the Sammamish River and adjoining aquifer, and thus benefiting the river habitat, the community of Kenmore will be demonstrating a 'fish friendly' approach to the environment. The river walk will be greatly enhanced with greater flows and improved habitat for the enjoyment of the community. By providing reclaimed water, a number of stakeholders benefit from the project, namely the actual irrigation water users, the resident communities, as well as the environmental and interest groups that monitor the health of the Sammamish River. While the project was ranked as favorable to the community, no official survey has been completed and the actual level of local, public and elected official support is not known.

Financial ⊗ ⊗ ◐

A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the projects or users to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost evaluation has not been completed. The estimated production cost of the project ranked 'neutral' with a unit cost of $5.65/ccf.

Other ◐

While the KCDNR Capital Improvement Program does not currently identify any projects that correspond to the North Sammamish River Reuse Project, future phases of the KCDNR Reclaimed Water Program could include additional increments of reuse that could be added to this project site. The project could also potentially by coordinated with the future north treatment facility project.

Newcastle

The Newcastle reuse project involves the construction of a 0.5 mgd satellite demonstration project in Newcastle near the Coal Creek Utility District Operations Center. This facility would be sized to provide Class A reclaimed water for irrigation to the Golf Club at Newcastle and process water to Mutual Materials Co., as shown in Figure 3.

Regulatory ◐○◐◐●●●●

The Newcastle reuse project was ranked favorable to neutral in the regulatory category because the two existing application sites identified currently are using potable water provided by Seattle Public Utilities via Coal Creek Utility District facilities. By replacing this potable water demand with reclaimed water, the drinking water can remain within the Cedar River, although there has been no commitment by the Coal Creek Utility District that this would be the case. Based on existing knowledge, there are no known health, liability or legal issues associated with using a Class A reclaimed water for irrigation or process uses. It is anticipated that there would be little environmental degradation and no shorelines or Corps of Engineers permits would be required because the treatment and pipeline facilities would essentially be located within developed areas and not adjacent to waterways. The one regulatory area that the Newcastle project scored less favorable was in water rights. Because neither of the users currently own water rights, the use of reclaimed water does not allow for the potential purchase or banking of water rights.

Community/Stakeholder ●⊗◐

The reclaimed water facilities in the Newcastle water reuse project are located within the community and used for irrigation to replace potable water; therefore, both the residents and the environment directly benefit from any mitigations measures associated with the facility. The project was ranked favorable for this criteria. At this time, it is not known the actual level of local public and elected official support for such a project. While the reclaimed water primarily benefits one user, there is another small volume user that would also benefit, as well as the municipality; therefore, the project was given a neutral ranking for this criteria.

Financial ⊗⊗◐

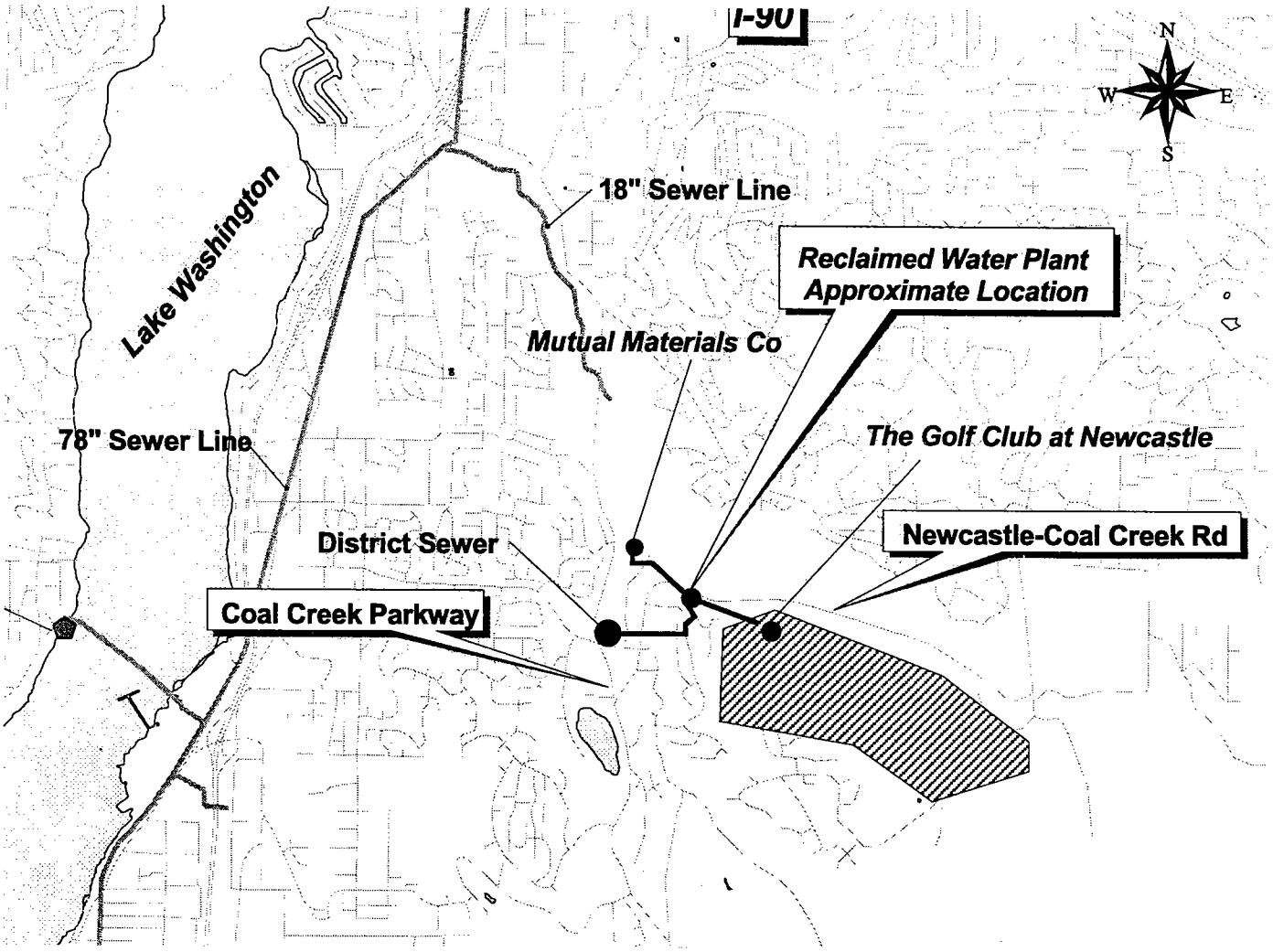
A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the project or users to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost ratio of this project is unknown. The estimated production cost of the project ranked 'neutral' with a unit cost of $5.98/ccf.

Other ○

The Newcastle reuse project does not appear to provide integration opportunities with any other KCDNR projects currently listed in the CIP now or any future reuse programs unless a significant number of other reuse applications are identified. Because of the location of the project, it is seen as a limited irrigation project.

Figure 3

Reclaimed Water Project Evaluation: Newcastle



Pumping Stations

KC Sewers

Streets

Proposed reclamation Water Pipe

User Area

Covington

The Covington reuse project suggested the construction of a satellite demonstration project within the Covington Water District at the existing Covington Pumping Station, as shown in Figure 4. This facility would be sized to provide Class A reclaimed water for irrigation to meet a peak demand up to 0.5 mgd, which is assumed to be sufficient to meet the peak demand of one golf course. The RFN did state that the reclaimed water could also be potentially used to serve a number of parks and/or schools. As stated previously in Technical Memorandum 420, there is currently insufficient wastewater flow available to meet the stated demands; however, ranking was conducted in the event that wastewater flows eventually increase and the project becomes viable. It had been noted that siting the treatment facility generally in Auburn potentially opens up reuse opportunities in the Auburn Valley area and could also potentially benefit Covington. That area was not included in the RFN or further analyzed here, but it is recommended for inclusion in a future evaluation.

Regulatory ◐○○●●●◐◐

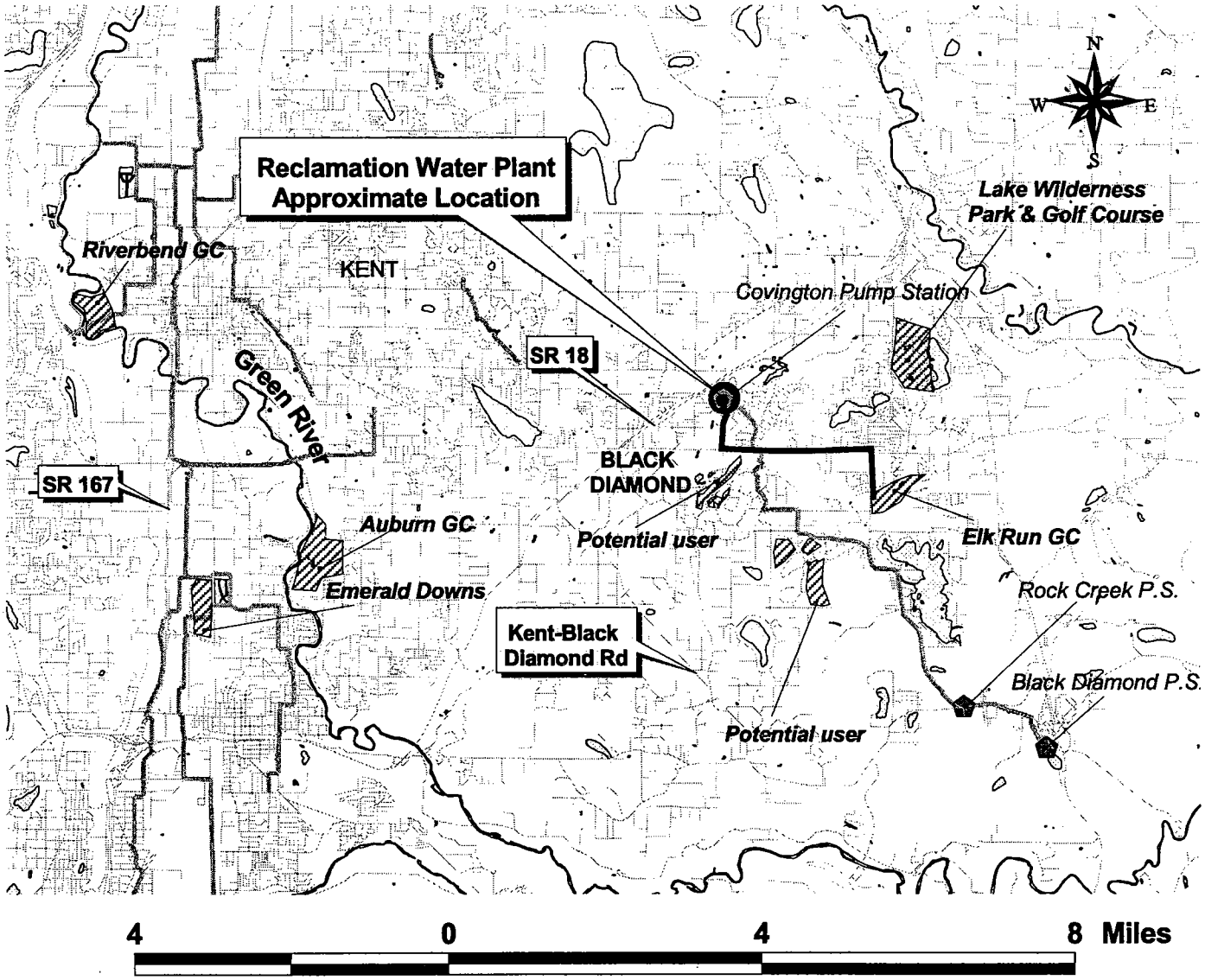
The Covington reuse project ranked favorable to neutral in the regulatory category. The groundwater is currently used for irrigation. Replacing the groundwater withdrawal with reclaimed water would provide a benefit to the Soos Creek and Green River Basin. However, the application also mentioned that the 'freed up' potable water could also be used for future growth, thus offsetting the benefits to fish and indirect streamflows. It was assumed that some permitting and environmental degradation could occur during implementation because much of the Covington area is semi-rural and contains numerous creeks and wetlands that could potentially be impacted depending on the routing of the reuse pipelines. Based on existing knowledge, there are no known health, liability or legal issues associated with using a Class A reclaimed water for irrigation or process uses. Although Covington Water District owns water rights totaling 7.92 mgd, it is considered highly unlikely that the Water District would be willing to give up those water rights based on their current water supply situation.

Community/Stakeholder ●⊗●

The long-term benefit of the Covington project to the community is ranked as favorable. The reclaimed water treatment facilities and users are located within the community, therefore mitigation measures associated with placement of the reuse facilities benefit the community, and 'freed up' potable water would be used for economic community development. At this time, it is not known the actual level of local public and elected official support for such a project. The Covington reuse project potentially benefits a number of stakeholders including schools, parks and/or golf courses.

Figure 4

Reclaimed Water Project Evaluation: Covington



- Pumping Stations
- KC Sewers
- Streets
- Proposed reclamation Water Pipe
- User Area

Financial ⊗ ⊗ ◐

A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the projects or users to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost evaluation of this project has not been completed. The estimated production cost of the project ranked 'neutral' with a unit cost of $6.26/ccf. There is also a potential that construction of the reclaimed water transmission main could be combined with the upcoming North Branch of the Tacoma Second Supply Project, thus resulting in some construction cost savings. This could also reduce the unit cost of the reclaimed water.

Other ○

A less favorable ranking was applied in this category because it is believed that there is nothing identified in the KCDNR Capital Improvement Program that corresponds to the Covington reuse project. Because of the distance and cost, it is unlikely that future phases of the KCDNR Reclaimed Water Program could consider the Covington area as a water reuse application site as the project is currently envisioned.

Tam O'Shanter

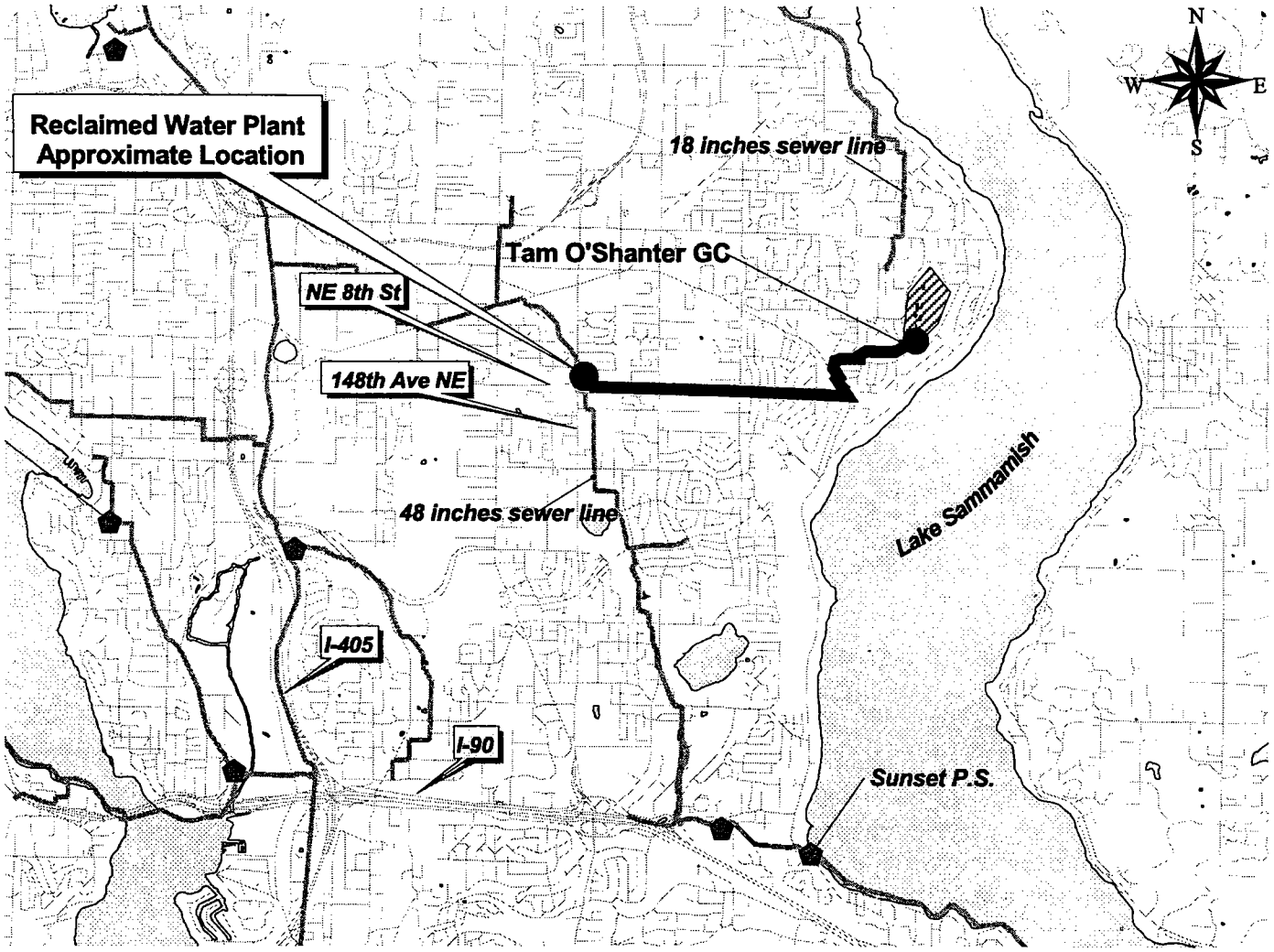
The Tam O'Shanter reuse project involves the construction of a satellite demonstration project in the Bellevue area near NE 8th Street and 148th Ave NE. A pipeline would be installed in city streets to convey reclaimed water to the Tam O'Shanter Golf Course for irrigation, see Figure 5.

Regulatory ◐ ○ ◐ ◐ ● ● ● ●

The Tam O'Shanter reuse project was ranked favorable overall in the regulatory category because the existing application site currently uses potable water provided by Seattle Public Utilities via City of Bellevue facilities. By replacing this demand with reclaimed water, the drinking water can remain within the Cedar River. This is compatible with a number of local and regional plans. However, there has been no commitment by the City of Bellevue that the "freed up" water would not be used to meet other demands. Based on existing knowledge, there are no known health, liability or legal issues associated with using a Class A reclaimed water for irrigation or process uses. It is anticipated that there would be little environmental degradation and permitting would not involve shorelines or Corps of Engineers because the treatment and pipeline facilities would essentially be located within developed areas. The one regulatory area that the Newcastle project ranked less favorable was in water rights. Because the user does not currently own water rights, there is no potential for the purchase or banking of water rights.

Figure 5

Reclaimed Water Project Evaluation: Tam O'Shanter



Community/Stakeholder ◐ ⊗ ○

For the Tam O'Shanter project, the reclaimed water is used for irrigation within the community and replaces potable water use; however, the treatment facilities are not proposed to be located in the vicinity where the reclaimed water is used. Therefore, the project is ranked neutral because benefits related to mitigation measures for facility siting will not benefit the community. At this time, it is not known the actual level of local public and elected official support for such a project. The reclaimed water primarily benefits the user as opposed to a number of stakeholders and thus was rated less favorable.

Financial ⊗ ⊗ ○

A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the project or the user to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost ratio of this project is unknown. The estimated production cost of the project ranked 'less favorable' with a unit cost of $10.33/ccf.

Other ○

The Tam O'Shanter reuse project does not appear to provide integration opportunities with any other KCDNR projects currently listed in the CIP now or any future reuse programs. This project receives a less favorable ranking unless a significant number of other reuse applications are identified in the vicinity to allow for an expansion of KCDNR's Reclaimed Water Program.

Table 3 presents the detailed ranking within each category for each identified project.

Conclusions

The intention of the evaluation was to rank the five reuse projects within the four identified categories in such a manner as to allow KCDNR to make a documentable and defensible decision on which projects to proceed with to the next phase. Table 4 summarizes the overall results of the evaluation process.

As shown in Table 4, each project was given an overall ranking based upon the evaluation criteria process. Sammamish River was ranked as '1' and is considered to be the project that should be moved into the next step, feasibility analysis. This project is seen as being favorable overall in the regulatory category and most beneficial to the community and stakeholders. Because there are a number of potential applications sites, the unit costs of providing reclaimed water for the Sammamish River project are the lowest of all projects evaluated.

Table 3
Phase I Project Nomination Ranking

	Sammamish River	North Sammamish River	Newcastle	Covington	Tam-O'Shanter
Description of Alternative	Treat near York PS w/ numerous irrigation application sites	Treat near Kenmore PS w/golf course irrigation sites	Golf course irrigation + industrial process	Treat near Covington PS w/irrigation sites	Golf course irrigation
Capital Project Cost					
	$43.6M	$17.5M	$10.2 M	$11.1 M	$11.0 M
Regulatory					
Consistent with GMA, RWSP and regional water plans	●	●	◐	◐	◐
Potential water rights (based on volume) to be offset or substituted	●	●	○	○	○
Enhances streamflows directly or indirectly	●	●	◐	○	◐
Beneficial to water bodies identified as 'low flows' or with endangered salmon listings	●	●	◐	●	◐
Liability or health issues	●	●	●	●	●
Legal constraints	●	●	●	●	●
Construction-related environmental impacts	◐	◐	●	◐	●
Permits	◐	◐	●	◐	●
Community/Stakeholder					
Long-term impacts to community where facilities are located	●	●	●	●	◐
Local public and elected official support	⊗	⊗	⊗	⊗	⊗
Benefits multiple stakeholders	●	●	◐	●	○
Financial					
Potential for funding opportunities	⊗	⊗	⊗	⊗	⊗
Benefit/cost ratio >1	⊗	⊗	⊗	⊗	⊗
Unit cost for reclaimed water produced	●	●	◐	◐	○
Other					
Integration with other KC projects	●	◐	○	○	○

● Favorable
◐ Neutral
○ Less Favorable
⊗ Not enough information

The North Sammamish River project received a ranking of '2'. While it ranked favorable in both the regulatory and community/stakeholder category, the unit cost was not as favorable as the Sammamish River project. Overall, the benefits of the project were very similar to the Sammamish River Project, but not as extensive. The North Sammamish River project would be a likely candidate for the future feasibility analysis if there are sufficient resources to consider a second project or if other sources become available to provide cost-effective reclaimed water.

Both the Newcastle and Covington projects were ranked 3rd overall. While the unit cost for the Covington project was lower than the Newcastle project, the Covington project is not viable until the wastewater volume available increases or additional sources of wastewater are obtained. Tam O'Shanter scored the lowest with a 4th ranking. The limited benefits to the community and stakeholders, as well as the unlikelihood of incorporating the project into other KCDNR programs, were viewed as factors to warrant a low rating for future analysis.

TABLE 4
Evaluation Matrix Summary

Category	Sammamish River	North Sammamish River	Newcastle	Covington	Tam O'Shanter
Regulatory	Favorable ●	Favorable ●	Favorable/neutral ●◐	Favorable/neutral ●◐	Favorable/neutral ●◐
Community/ Stakeholder	Favorable ●	Favorable ●	Favorable/neutral ●◐	Favorable ●	Neutral/less favorable ◐/○
Financial	Favorable ●	Neutral ◐	Neutral ◐	Neutral ◐	Less favorable ○
Unit Cost ($/ccf)	$4.01	$5.65	$5.98	$6.26	$10.33
Other	Favorable ●	Neutral ◐	Less favorable ○	Less favorable ○	Less favorable ○
Overall Ranking	**1**	**2**	**3**	**3**	**4**

Recommendations

The evaluation and ranking presented herein was based solely on the information presented in the RFNs and knowledge of local environmental conditions. It is recommended that each of the parties that submitted RFNs be interviewed, particularly with respect to the ranking criteria. This information can then be used to supplement the initial evaluation and reassess the conclusions of the ranking.

While evaluating the potential project suggested by the Covington Water District, it became apparent that another project might include irrigation uses within the Auburn Valley. Based on the location and flows of the KCDNR interceptors in that area, and the number of potential irrigation sites, a feasible demonstration project could potentially be located in that area. It is recommended that KCDNR evaluate an Auburn Valley project to the same level of detail as the projects assessed in this document to confirm the projects to be included in KCDNR's demonstration phase.

King County Reclaimed Water Assistance Program

Identification and Ranking of Additional Water Reuse Projects

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DATE: August 16, 2000

REVISED: August 31, 2000
November 16, 2000

Background

King County Department of Natural Resources (KCDNR) is in the first phase of a demonstration project to identify potential satellite projects for non-potable uses. To date, the focus has been on looking at using reclaimed water to meet identified non-potable water demands in an appropriate, beneficial and cost effective manner. Through the process, two new water reuse projects were identified and evaluated, Auburn/Kent Valley Water Reuse and Modified Sammamish River Reuse. That discussion can be found in Technical Memoranda AWSA100 and 110.

This technical memorandum identifies a third new water reuse project, Reclaimed Water From Proposed Future Regional Wastewater Treatment Plant. In addition, this technical memorandum describes the process that was used to rank all three of the water reuse projects based on the process previously established and presented in *Identification of Potential Satellite Projects for Direct Non-Potable Uses – Draft Report* (September 2000). Based on the results included herein, those projects considered to be generally favorable may be taken forward for a subsequent feasibility analysis.

Potential Water Reuse Project Description

One additional water reuse project was identified to be used for comparison with previously developed water reuse options to meet the identified non-potable water demands within the Sammamish River and North Sammamish River area from May to September:

- Reclaimed water from proposed future regional wastewater treatment plant

Reclaimed Water From Proposed Future Regional Wastewater Treatment Plant

KCDNR is currently in the process of investigating a number of sites for the future location of a regional wastewater treatment plant in the northern portion of the service area. The majority of the potential sites are centered in northern King County above Lake Washington and on north up into Snohomish County. This water reuse alternative would involve the addition of 5.85 mgd of tertiary treatment processes to the future regional wastewater treatment plant and conveyance of the resultant reclaimed water to the identified users in the Sammamish Valley. Because this alternative would be located in the north and the volume of reclaimed water available would not be a limiting factor, it was assumed that the project would serve all users, therefore only Phase 2 (as described in Technical Memorandum No. 420) was considered.

Because the future regional wastewater treatment plant project is still in the preliminary planning phase and one specific site has not been determined, sample representative areas were chosen to allow for the development of a range of costs. Figure 1 shows a general radius that was used for estimating a range of costs of a plant location and subsequent conveyance facilities. The future regional plant is estimated to be on-line in 2010; therefore, the irrigation users would not be able to abandon Sammamish River surface water and groundwater withdrawals until at least that time.

Table 1 presents the development of the reclaimed portion of the future regional plant project for Phase 2. As stated previously, projects costs were developed consistent with the assumptions presented in Technical Memorandum No. 330. Details for each of the cost items are presented in the Attachment.

TABLE 1
Reclaimed Water From the North End Plant

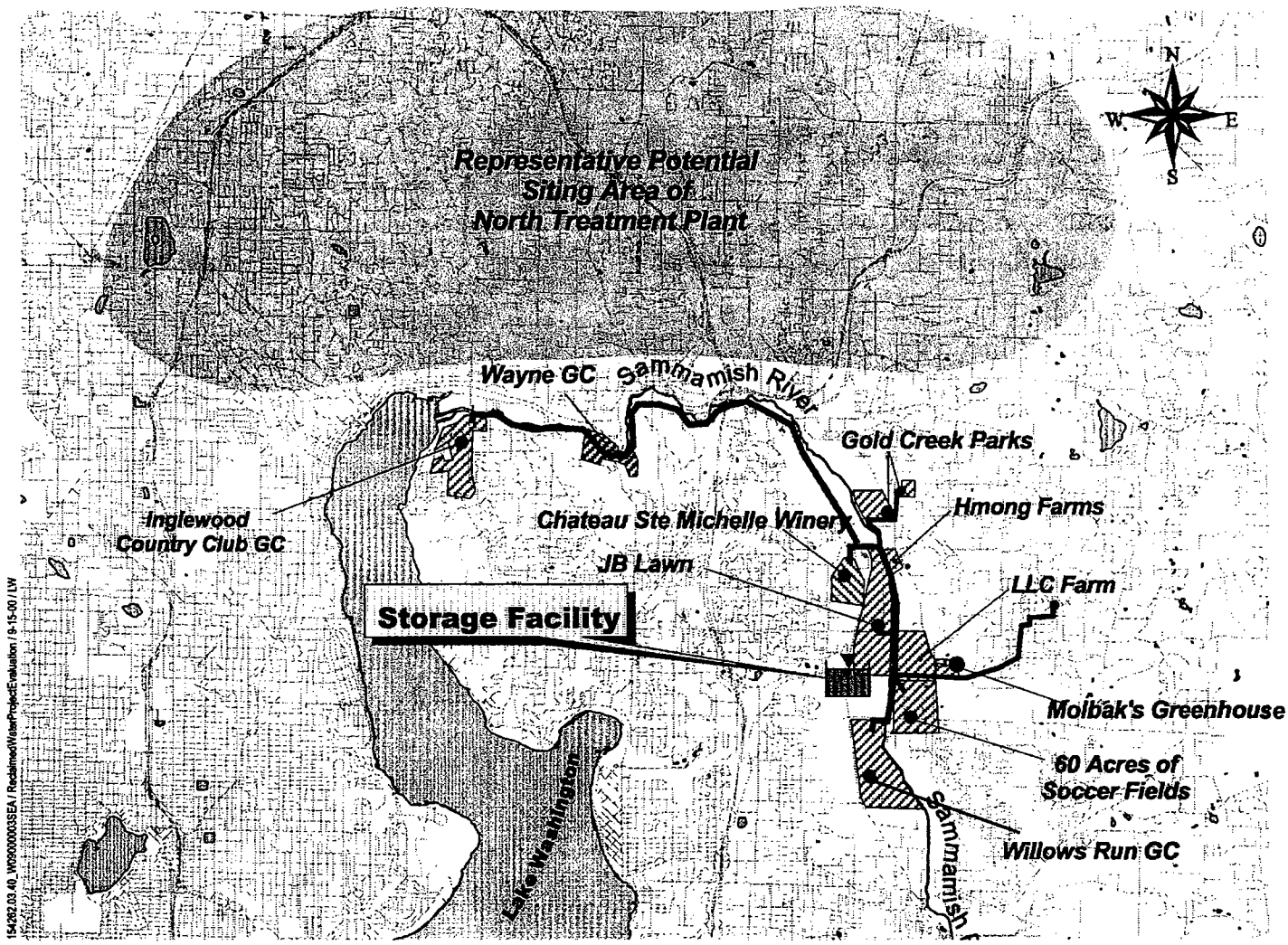
Item	Capital Costs	O&M Costs	Levelized Unit Cost ($/ccf)
Phase 2:			
Distribution System	$15.4M to $21.5M	$104,000-$157,000	
Tertiary Treatment	$9.7M	$244,000	
Total Phase 2:	**$25.1M to $31.2**	**$348,000 to $401,000**	**$1.84 to $2.19**

Evaluation Criteria

The evaluation criteria were originally defined and developed to be used for the ranking of the reclaimed water projects that resulted from the Request for Project Nomination process. The definition and development of that ranking process is thoroughly described in the *Reclaimed Water Program Demonstration Phase: Identification of Potential Satellite Projects for Direct Non-Potable Uses, Summary Report and Appendices* (KCDNR, 2000). This section of the technical memorandum will focus on the changes/additions to the established evaluation criteria.

Figure 1

Reclaimed Water Project Evaluation: North Treatment Plant



KCDNR added two additional criteria to be added to the original set:

- Minimize long-term adverse impacts
- Demonstrate new 'alternative' technologies in water and wastewater

These additional criteria have been added to the original set and are presented in Table 2. In addition, some wording changes have taken place to more clearly define the element and/or eliminate specific references to reclaimed water to make the descriptions more universal for any water supplies.

TABLE 2
Evaluation Criteria for Water Reuse Projects

Regulatory	Community/Stakeholder	Financial	Other
Consistent with GMA, RWSP and regional water plans	Long-term benefits to community where facilities are located	Potential for funding opportunities	Integration with other KC projects
Potential water rights to be offset or substituted	Minimize long-term adverse impacts	Benefit/cost evaluation	Demonstrates new 'alternative' technologies in water and wastewater
Enhances streamflows directly or indirectly	Local public and elected official support	Unit cost for water produced	
Beneficial to water bodies identified as 'low flows' or with endangered salmon listings	Benefits multiple stakeholders		
Liability or health issues			
Legal constraints			
Construction-related environmental impacts			
Timeliness of Permits			

Evaluation Ranking

Three water reuse projects were included in this evaluation process:

- Reclaimed Water from Proposed Regional Wastewater Treatment Plant
- Auburn/Kent Valley Water Reuse
- Modified Sammamish River Water Reuse

The reclaimed water project from the proposed regional wastewater treatment plant was described above. The Auburn/Kent Valley Water Reuse project and the Modified Sammamish River Water Reuse project were thoroughly described in Technical Memoranda AWSA-100 and 110, respectively.

For each evaluation criteria shown in Table 2, definitions were developed that listed what represented a 'favorable - ●', 'neutral - ◐', or 'unfavorable ranking - ○'. In addition to the three rankings previously stated, a 'not enough information - ⊗' ranking was developed for those cases where available information was insufficient to make a determination. Representatives from the consultant team evaluated each of the projects against the specific criteria and ranked each one. The information used to perform the evaluation was based on information developed herein and in Technical Memoranda AWSA-100 and 110. The complete list of definitions used in the evaluation ranking is presented in Table 3.

A discussion of the evaluation ranking for each project is presented below. Each of the four categories is represented by a paragraph. Each of the criterion is represented by a ranking symbol. A brief explanation of the rationale for each ranking is presented in the paragraph discussion. The specific ranking results are presented in Table 4 at the end of this section.

Reclaimed Water from Proposed Future Regional Wastewater Treatment Plant

KCDNR is currently in the process of investigating a number of sites for the future location of a regional wastewater treatment plant. The majority of the potential sites are centered in northern King County above Lake Washington and on into Snohomish County to the north. This alternative would involve the addition of tertiary treatment processes to the proposed plant and conveyance of the resultant reclaimed water to the identified users in the Sammamish Valley. Because the regional treatment plant is still in the preliminary planing phase, a specific site has not yet been chosen. Therefore, sample representative areas were chosen to allow for the development of a range of costs. Figure 1 presents the general areas that were used for a treatment plant location and the associated conveyance facilities.

Regulatory ●●●●●●◐◐

Supplying reclaimed water from the proposed regional wastewater treatment ranks favorably in a number of elements: (1) consistent with numerous regional plans because it recycles water to use in place of potable water; (2) by substituting reclaimed water for the current non-potable water source, the current surface and groundwater withdrawals can cease and those water rights can be transferred to the Department of Ecology water bank; (3) the flow in the Sammamish River would be enhanced by eliminating direct and indirect withdrawals; (4) it would be beneficial to a river that contains endangered salmon listings; (5) there are no known liability or health issues associated with the use of properly treated reclaimed water for non-potable uses, and (6) there are no known legal constraints associated with using reclaimed water for irrigation applications. Construction related impacts are ranked as neutral because a portion of the pipeline would be located in roadways and environmental impacts are not anticipated to be severe. Timeliness of permits is ranked neutral because it is expected that permits could be obtained within one to three years.

TABLE 3
Project nomination ranking notes

Criteria	Favorable	Neutral	Less Favorable	Notes
REGULATORY				
Consistent with GMA, RWSP, and regional water plans	Meets all listed items	Meets 1 or 2 of listed items	Meets none of listed items	
Potential water rights (based on volume) to be offset or substituted	The application site(s) allows the potential opportunity to obtain water rights (>50%)	Between 20%-50% of the application sites offer the opportunity to obtain water rights	Application site has no water rights, or less than 20% of the sites offer an opportunity to obtain water rights	Cost to obtain water rights or volume of water available are not factors included in this evaluation
Enhances streamflows directly or indirectly	Commitment to returns flow to stream by elimination of surface water withdrawals	Substitution of alternate water source implies that surface or groundwater would return to stream	Indication that potable water saved would be used to supply other demands rather than returned to stream	Assumed that purveyors would use "saved" water to meet other demands, unless otherwise noted
Beneficial to water bodies identified as 'low flows' or with endangered salmon listings	Returns flows to such identified streams and improves water quality to same streams	Return flows to streams not identified as "low flows" or endangered salmon listings	No perceived benefit to flows or endangered salmon listings	Incorporates salmon enhancement features; net water quality features
Liability or health issues	No perceived or identified liability or public health issues		Similar applications in other areas have experienced perceived liability or health issues with same applications	- Liability i.e. degradation of groundwater - Health i.e. exposure to wastewater, pathogens,
Legal constraints	No known legal constraints		Legal constraints have been identified	Restricted uses
Construction-related environmental impacts	Little to no perceived environmental impact	Mitigation required to siting of facilities will be required	Severe environmental impact	Impact to wetlands, stream crossings, habitat, etc.
Timeliness of Permits	Easy to obtain permits in less than one year. For example not required to obtain permits such as shorelines or Corps of Engineer 404 permit, or water rights	Moderate effort to obtain permits within 1 to 3 years.	Likely to take more than 3 years to obtain permits.	

Project nomination ranking notes

Criteria	Favorable	Neutral	Less Favorable	Notes
Community/Stakeholder				
Long-term benefits to community where facilities are located	(1) facilities and associated mitigation measures serve as enhancement to the community; (2) non potable water used within the community, replacing potable water; (3) 'freed up' water returned to fish locally or used for direct economic benefits	One or two of the measures listed under 'favorable' occur within the community	None of the measures cited under 'favorable' occur within the community	
Minimize long term adverse impacts	Has little to no adverse impact to the community and environment	Has measurable adverse long-term impact to community and environment	Has substantial long-term adverse impact to community and environment	Adverse long-term impacts defined as adverse to natural and built environment, such as ongoing odors, traffic, continuing withdrawal from waterways, habitat degradation.
Local public and elected official support	Appears to be greater support than opposition demonstrated by public and elected officials	No public/political opinion or mixed opinions have been expressed	There appears to be more opposition than support by public and/or elected officials	Meets regional water needs; willing customers; border disputes
Benefits multiple stakeholders	Benefits municipalities, interest groups, neighborhood groups and/or developers		Primarily benefits the user	
Financial				
Potential for funding opportunities	Multiple funding opportunities (up to 20%) identified through cost sharing, grants or loans	Single funding opportunity (0-19%)	King County sole financier	
Benefit/cost evaluation	B/C >X	B/C = X – X	B/C<X	Definition of 'benefit' in a financial sense still being determined
Unit cost for water produced	Unit cost <$5.00 ccf	Unit cost = $5.00-10.00/ccf	Unit cost >$10.00/ccf	

Project nomination ranking notes

Criteria	Favorable	Neutral	Less Favorable	Notes
Other				
Integration with other KC projects	Portion of project can be coordinated with KCDNR's CIP or Wastewater HCP or Farm Preservation Program	Project can potentially be coordinated with future phase of KCDNR reclaimed water program	No relationship to any current or future KCDNR project; project stands alone	
Demonstrates new 'alternative' technologies/management techniques in water and wastewater	Provide opportunity to demonstrate/research new technologies/techniques	Technology/technique currently being investigated or piloted in another location	No new technologies or techniques afforded by this project.	

Community/Stakeholder ◐ ● ⊗ ●

Providing reclaimed water from a regional wastewater treatment plant is beneficial to the community because it replaces potable water with non-potable water and the 'freed up' water is returned to the river for fish; however, the facilities are located a distance from the actual use sites so mitigations would not benefit the community; therefore, it received a neutral ranking. The project received a favorable ranking in long-term adverse impacts because the use of reclaimed water with its required facilities are expected to have little to no adverse impact to the community and environment. At this time, it is not known the actual level of local public and elected official support for such a project. A number of stakeholders benefit from this project, namely the irrigation users, as well as the resident communities and environmental and interest groups that monitor the Sammamish River.

Financial ⊗ ⊗ ●

A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the projects or users to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost evaluation of this project has not been completed. The estimated production cost of the project ranked 'favorable' with a unit cost of $1.61 to $2.42/ccf.

Other ● ●

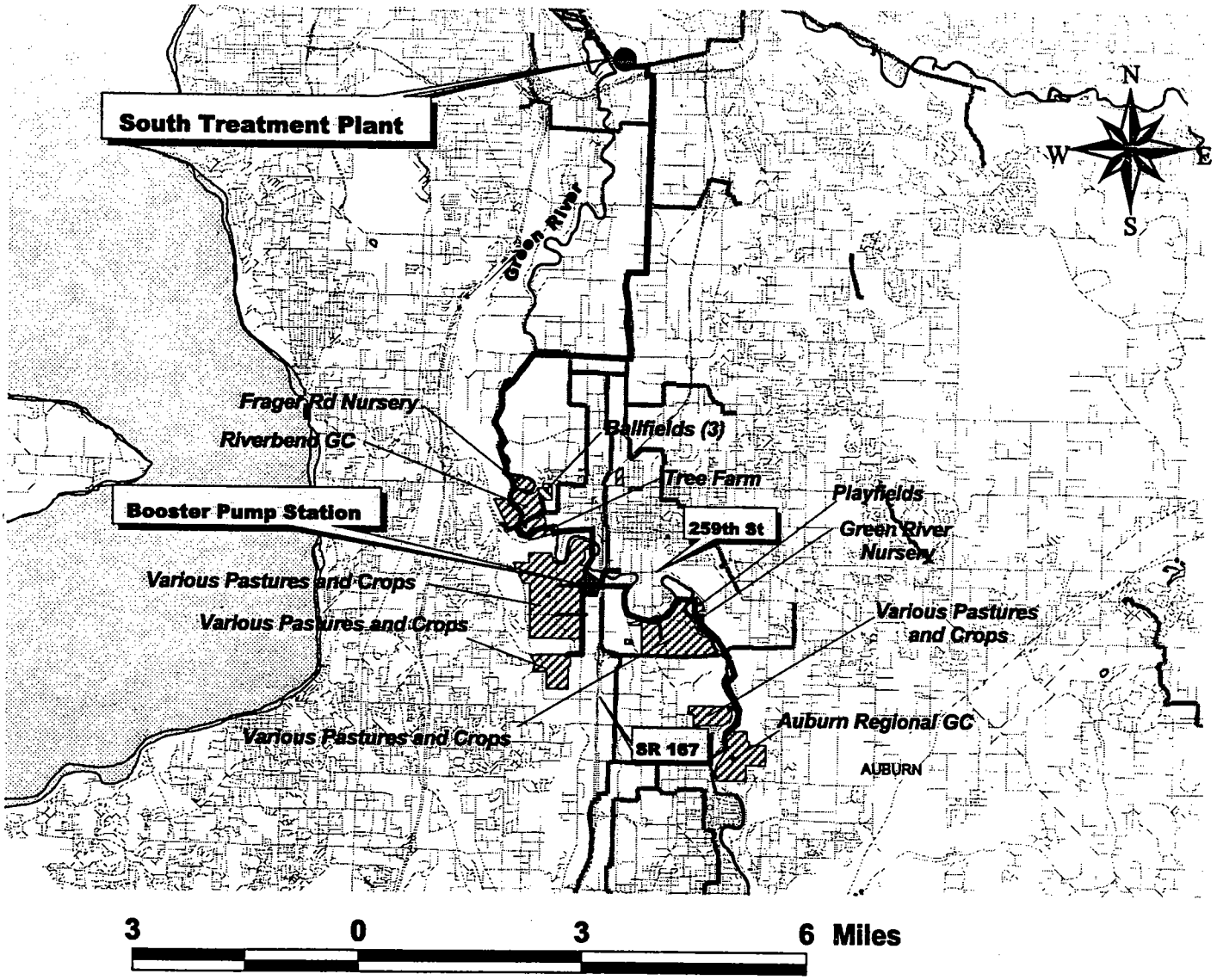
Providing an alternate source of water for irrigation corresponds with KCDNR's Farm Preservation Program in the Sammamish Valley. Adding water reuse treatment facilities to the proposed regional wastewater treatment plant allows for the opportunity to explore alternative technologies, therefore, the project received a favorable ranking for this element.

Auburn/Kent Valley Water Reuse Project

The Auburn/Kent Valley water reuse project involves providing reclaimed water to a number of potential irrigation sites (farmland, golf courses, nurseries and parks) that are located generally to the east and west of State Route (SR) 167 in the Auburn/Kent area. Two scenarios were explored for providing reclaimed water: (1) construct a satellite plant in the vicinity of the users, or (2) expand the existing reclamation facilities at KCDNR's South Treatment Plant at Renton and convey the reclaimed water south to the users. The first scenario, a satellite plant, would be constructed in phases because the volume of wastewater available for reclamation was limited. There was no source restriction on scenario two, the regional plant expansion. The capital costs for scenario one were nearly 40 percent higher than scenario two. For these two reasons, reclaimed water volume and costs, only scenario two is included in this evaluation process. A schematic of the reclaimed water facilities and application sites are presented in Figure 2.

Figure 2

Reclaimed Water Project Evaluation: Auburn/Kent Valley



Streets

KC Sewers

Proposed Reclamation Pipeline

User Area

Regulatory ●⊗●◐●●◐◐

Within the regulatory category, the Auburn/Kent Valley project ranked generally favorable to neutral. The project would be consistent with regional planning documents. Not enough information is known about the current water right status of the various irrigators to be able to determine if water rights could be returned to the state. Because most of the irrigators are believed to draw water from the surface and/or groundwater, that element was ranked as favorable for enhancing streamflow. However, because the Green River does not contain an endangered salmon listing, that element only received a neutral ranking. Based on existing knowledge, there are no known health, liability or legal issues associated with using a Class A reclaimed water for irrigation uses. Construction related impacts are ranked as neutral because a portion of the pipeline would be located in roadways and environmental impacts are not anticipated to be severe. Timeliness of permits is ranked neutral because it is expected that permits could be obtained within one to three years.

Community/Stakeholder ◐ ●⊗●

The Auburn/Kent Valley project was ranked as neutral for long-term benefits to the community because the plant expansion is located outside of the Auburn/Kent community. Not all of the associated mitigation measures will necessarily be applied to the community. There is little to no adverse long-term impact associated with this project, thus a favorable ranking for that element. At this time, it is not known the actual level of local public and elected official support for such a project. There are numerous stakeholders that could benefit from this project.

Financial ⊗⊗●

A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the projects or users to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost evaluation of this project has not been completed. The estimated production cost of the project ranked 'favorable' with a unit cost of $2.16/ccf.

Other ●●

Providing an alternate source of water for irrigation corresponds with KCDNR's Farm Preservation Program in the Lower Green River agricultural production district. Reclamation facilities allow for the opportunity to explore alternative technologies, therefore, the project received a favorable ranking for this element.

Modified Sammamish River Water Reuse

The Sammamish River Water Reuse project was identified and evaluated in *Identification of Potential Satellite Projects for Direct Non-Potable Uses: Draft Summary Report*, July 2000. In subsequent discussions with the Task Force, KCDNR was requested to look at decreasing the project size to serve fewer users in the Sammamish River area in an effort to decrease the capital costs. The evaluation of the Modified Sammamish River Water Reuse project (also

known as Phase 1) is documented in Technical Memorandum AWSA-110. The project consists of a 3.18 mgd reuse treatment plant near the York Pump Station. The reclaimed water produced would serve three application sites. A schematic of the reuse facilities and application sites is presented in Figure 3.

Regulatory ●●●●●●◐◐

Within the regulatory category, the Modified Sammamish River project ranked generally favorable. Providing reclaimed water to the identified irrigation users would be compatible with a number of local and regional planning documents. The irrigation users currently have water rights and draw water from the Sammamish River or the groundwater table adjacent to the waterway. By replacing that need with reclaimed water, much of the water remains in the Sammamish River during the low flow period and the water rights could potentially be purchased or banked with the Department of Ecology. Keeping water within the Sammamish River is beneficial as a potential Endangered Species Act (ESA) mitigation because the waterway serves as a primary link between Lake Washington and Lake Sammamish for several migrating salmon species. Based on existing knowledge, there are no known liability or health issues associated with the use of properly treated reclaimed water for non-potable uses. This project received neutral ratings in both the construction related impacts and timeliness of permits because construction of the pipelines would be generally within the existing trails and roads and it is expected that permits could be obtained within one to three years.

Community/Stakeholder ●●⊗●

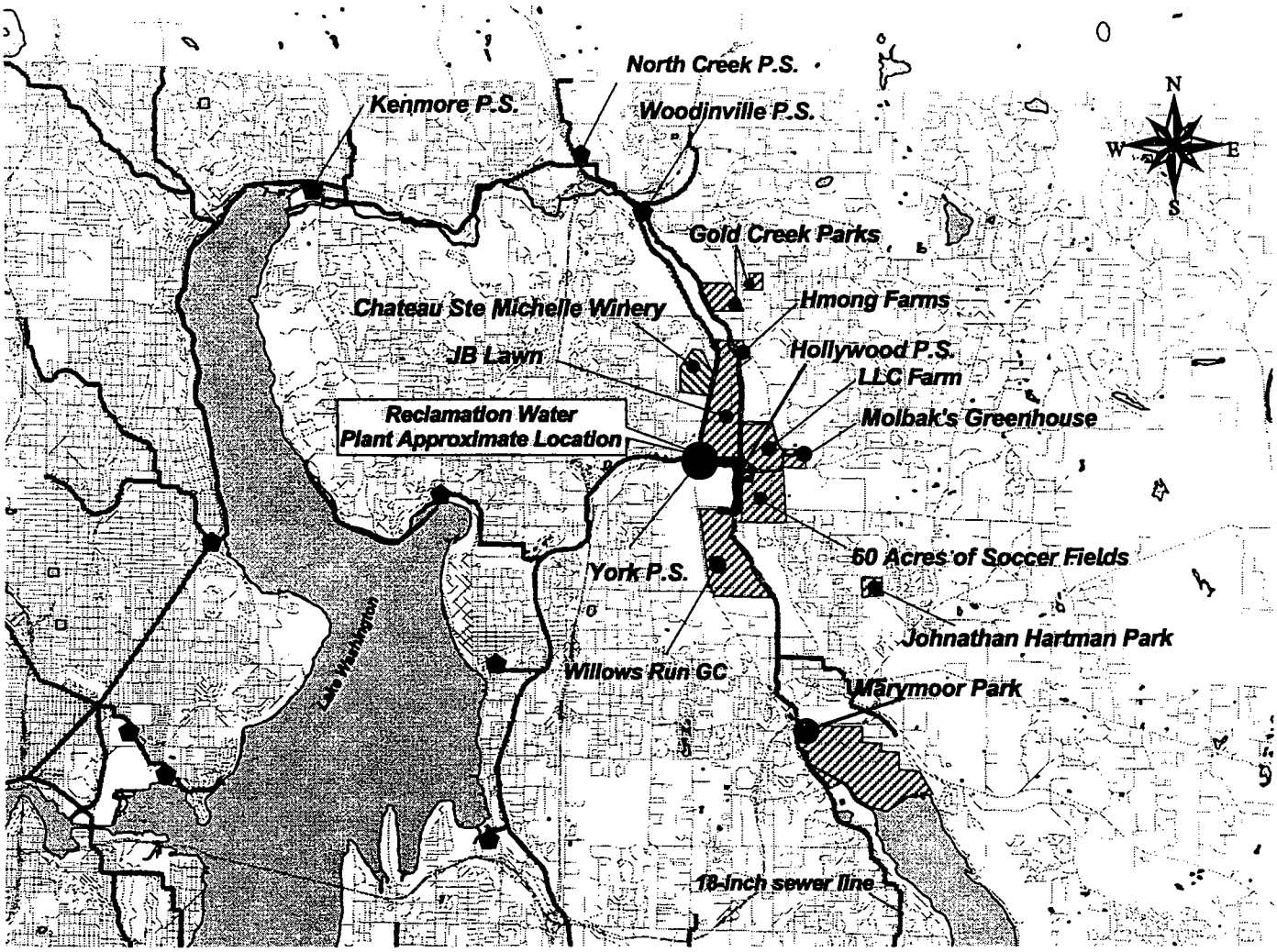
Modified Sammamish River was ranked as favorable for long term benefits to the community. The treatment facility will be located in the Redmond community and the irrigation sites are located in both Redmond and Woodinville. By eliminating summer season withdrawals from the Sammamish River and adjoining aquifer, and thus benefiting the river habitat, the communities of Redmond and Woodinville will be demonstrating a 'fish friendly' approach to the environment. The project received a favorable ranking in long-term adverse impacts because the use of reclaimed water with its required facilities are expected to have little to no adverse impact to the community and environment. While the project was ranked as favorable to the community, no official survey ahs been completed and the actual level of local public and elected official support is not known. A number of stakeholders benefit from this project, namely the irrigation users, as well as the resident communities and environmental and interest groups that monitor the Sammamish River.

Financial ⊗⊗●

A project is considered to be favorable if there is the potential for multiple funding opportunities. At this time, not enough is known about the projects or users to determine the likelihood for receiving private, local, state or federal funds. The definition of 'benefit' in a financial sense still has to be determined for reuse projects; therefore, the benefit/cost evaluation of this project has not been completed. The estimated production cost of the project ranked 'favorable' with a unit cost of $4.08/ccf.

Figure 3

Reclaimed Water Project Evaluation: Modified Sammamish River



- Pumping Stations
- KC Sewers
- Streets
- Proposed Reclamation Pipeline
- User Area

September 2000

Other ● ●

Providing an alternate source of water for irrigation corresponds with KCDNR's Farm Preservation Program in the Sammamish Valley. Constructing a reclaimed water satellite facility allows for the opportunity to explore alternative technologies, therefore, the project received a favorable ranking for this element.

Table 4 presents the detailed ranking within each category for each identified project.

Conclusions

The intention of the evaluation was to rank the water reuse projects within the four identified categories in such a manner as to allow KCDNR to make a documentable and defensible decision on which projects to proceed with to the next phase. Table 5summarizes the overall results of the evaluation process where each concept or project was given an overall ranking based upon the evaluation criteria process.

Reclaimed water from the Proposed Future Regional Wastewater Treatment Plant was ranked as '1' based on the evaluation criteria and categories evaluated within this document. One item that is not included within this process is the realistic timing of implementation for the various projects. While the Proposed Future Regional Plant did rank as number one, the RWSP does not call for the plant to be on-line until 2010. Therefore, this project would require additional analysis to assess the timing and benefits associated with satellite facilities and water reuse in the Sammamish Valley.

The Modified Sammamish River project also ranked as a number one project. It meets the goals of the Demonstration Phase and is considered to be very beneficial to the community and stakeholders, as well as meeting KCDNR's planning goals. This project could move into the next step feasibility analysis.

The Auburn/Kent Valley water reuse project was ranked as '2'. This project is seen as being consistent with KCDNR's planning goals. If monies were available for a second demonstration project, this project could be considered for the next feasibility analysis based on this ranking. There are two elements that would need to be specifically analyzed in a future evaluation. The first would be to determine the actual status of water rights and actual irrigation demands. The second element is that if the project were to be scaled back to meet KCDNR's capital expenditure limits, the unit cost would need to be reevaluated and reranked to determine if the project is still favorable in that aspect.

Recommendations

The evaluation and ranking presented herein was based on the information presented herein and in Technical Memoranda AWSA-100 and 110 and previously established ranking criteria. Based on the results of this evaluation for the water reuse projects presented herein, it is recommended that KCDNR proceed with the top second ranked project, Modified Sammamish River, for inclusion in the next phase – feasibility analysis. Because of the delay

Table 4
Water Reuse Projects Ranking

	Reclaimed Water From Proposed Future Regional WWTP	Auburn/Kent Valley Reclaimed Water via South Treatment Plant	Modified Sammamish River
Description of Alternative	golf course, playing fields and turf irrigation	farmland, golf course, nurseries and park irrigation	golf course, playing fields and turf irrigation
Capital Project Cost/Unit Cost			
	$11.3 M to $36.3 M $1.61 to $2.42/ccf	$38.3M $2.16/ccf	$30.5 M $4.08/ccf
Regulatory			
Consistent with GMA, RWSP and regional water plans	●	●	●
Potential water rights (based on volume) to be offset or substituted	●	⊗	●
Enhances streamflows directly or indirectly	●	●	●
Beneficial to water bodies identified as 'low flows' or with endangered salmon listings	●	◐	●
Liability or health issues	●	●	●
Legal constraints	●	●	●
Construction-related environmental impacts	◐	◐	◐
Timeliness of permits	◐	◐	◐
Community/Stakeholder			
Long-term benefits to community where facilities are located	◐	◐	●
Minimize long-term adverse impacts	●	●	●
Local public and elected official support	⊗	⊗	⊗
Benefits multiple stakeholders	●	●	●
Financial			
Potential for funding opportunities	⊗	⊗	⊗
Benefit/cost ratio >1	⊗	⊗	⊗
Unit cost for water produced	●	●	●
Other			
Demonstrates new 'alternative' technologies in water and wastewater	●	●	●
Integration with other KC projects	●	●	●

● Favorable
◐ Neutral
○ Less Favorable
⊗ Not enough information

in construction of the future regional wastewater treatment plant, that project is recommended to be included in subsequent phases of KCDNR's reclaimed water program.

TABLE 5
Evaluation Matrix Summary

Category	Reclaimed Water From Proposed Future Regional WWTP	Auburn/Kent Valley Water Reuse	Modified Sammamish River Water Reuse
Regulatory	Favorable ●	Favorable/neutral ●/◐	Favorable ●
Community/Stake holder	Favorable ●	Favorable ●	Favorable ●
Financial	Favorable ●	Favorable ●	Favorable ●
Unit Cost ($/ccf)	$1.61 to $2.42/ccf	$2.16/ccf	$4.08/ccf
Other	Favorable ●	Favorable ●	Favorable ●
Overall Ranking	**1**	**2**	**1**

Before finalizing the alternatives to be included in the subsequent feasibility analysis, it is recommended that KCDNR add the two new evaluation elements ('minimize long-term adverse impacts' and 'demonstrate new alternative technologies') to the previously evaluated five water reuse alternatives presented in the *Reclaimed Water Program Demonstration Phase: Identification of Potential Satellite Projects for Direct Non-Potable Uses, Summary Report and Appendices* (KCDNR, 2000). Those projects can then be directly compared to the ranking of the alternative water supply concepts and water reuse projects presented in this technical memorandum.

By taking all of the water reuse and alternative water supply projects and comparing them equally based on the same criteria, KCDNR can definitively rank the projects and proceed with the most favorable project(s) into the feasibility analysis stage. This process can take place in the summary report that will be prepared to document the various evaluations that took place throughout the first phase of the Reclaimed Water Demonstration Phase.

Attachment 1: Cost Estimating Spreadsheets

TASK AWSA-210: DISTRIBUTION SYSTEM COSTS - CONSTRUCTION COSTS

Includes pumps and pipeline from the the satellite plant to the user

Project	Pipe Routing (to Main User(s))	Total capacity MGD	Piping length L (ft)	Flow for Pipe sizing[g] MGD	D inches	v ft/sec	Manning's n	Manning's friction loss Hf (ft)	static head ft	Delivered P requ'd ft	Max THD ft	Peak Day TDH ft	Pump Station or ASR Facility Costs: Base Constr. costs, $	Contin-gency 25%, $	Sales tax 8.6%, $	Total pump sta. constr cost, $	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Major Facilities: Raising Lake Sammamish Lake Costs/Storage/Tertiary Treatment: base project constr cost, $	Contin-gency 25%, $	Mob/ Demob, 10%, $	Sales tax 8.6%, $	Total constr cost,$	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Pipeline construction Costs[e]: pipeline unit cost, $/lf	base pipe constr cost, $	Contin-gency 25%, $	Sales tax 8.6%, $	Total pipeline constr cost,$	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	Total Project Cost Year 2000 $
RECLAIMED WATER FROM PROPOSED FUTURE REGIONAL WASTEWATER TREATMENT PLANT[f]																																
Pumps	Pump Station at Treatment Plant	5.85 MGD											627,887	156,972	53,998	838,857	293,600	1,132,457														
Storage	Storage Reservoir near York Pump Station	1.9 MG																													$	15,432,512
Pipes	River Mouth to Inglewood GC		1,000	0.66	6	5.21	0.010	20			540								468,357	117,089	58,545	55,383	699,374	244,781	944,155								
	River Mouth to Wayne GC		8,500	6.39	16	7.10	0.010	84																		47	47,000	1,447,150	497,820	7,733,570	2,706,749	10,440,319	
	Wayne GC to Gold Creek Park / Winery		20,500	5.73	18	5.03	0.010	87																		79	671,500						
	Gold Creek Parks' Pipe		3,800	0.78	8	3.47	0.010	23																		87	1,783,500						
	Ste. Michelle's Pipe		4,500	0.53	6	4.19	0.010	57																		52	197,600						
	Gold Creek Park to JB Lawn		5,200	4.42	14	6.41	0.010	50																		47	211,500						
	JB Lawn to Molbak's / 60 Acres		3,000	2.77	10	7.88	0.010	68																		71	369,200						
	Molbak's Pipe		3,700	0.04	4	0.71	0.010	2																		57	171,000						
	60 Acres' Pipe		700	0.26	6	2.05	0.010	2																		42	155,400						
	Molbak's / 60 Acres to Willows Run GC**		3,000	2.47	10	7.02	0.010	54																		47	32,900						
	Willows' Pipe		1,500	1.27	8	5.64	0.010	24																		57	171,000						
Plant Site Option 1	Location 18 to Sammamish River junction # 1 [g]		19,000	7.05	20	5.01	0.010	69																		52	78,000						
	Total Proposed Regional WW Treatment Plant		74,400																							100	1,900,000						
Plant Site Option 2	Location 62 to Sammamish River junction # 2 [g]		22,500	7.05	20	5.01	0.010	82																			5,788,500						
	Total Proposed Regional WW Treatment Plant 2		77,900																							100	2,250,000	1,534,650	527,920	8,201,170	2,870,409	11,071,579	$ 16,210,813
Plant Site Option 3	Location 36 to Lake Washington Inlet		42,000	7.05	22	4.14	0.010	82																			6,138,600						
	Total Proposed Regional WW Treatment Plant 2		181,300																							110	4,620,000	2,127,150	731,740	11,367,490	3,978,621	15,346,111	$ 21,481,016
																											8,508,600						

values in table use 1995 dollars. Total project estimates inflated to 2000 dollars based on 1.23 multiplier.

a. The reclaimed water produced is distributed to multiple users; distribution line costs are calculated for various section and added to give total cost.

b. Distribution lines are sized to provide peak hour demand to non golf course users and peak day demand to golf course users.

c. It is assumed that storage is not necessary at golf course locations where existing ponds can be used for reclamation water storage.

d. ASR supply line sizing based on constant rate pumping during the winter months of November through February.

e. Pipeline cost estimates assume pipes in improved street areas and are based on the updated unit costs used for estimating capital improvements for the Sammamish Plateau Water and Sewer District Water Comprehensive Plan. Costs were based on an August 1999 Seattle ENR CCI of 6928 and were adjusted to the February 2000 value of 7151.

f. The capital costs for pumping and storage facilities are assumed to be the same as for Option 3a. The pump capacity and average volume are also assumed to be the same as Option 3a.

g. The total flow used for pipe sizing the major pipelines is slightly larger than the sum of PDD for all users to accommodate Marymoor in the future.

Contingency = 25.0%
Sales tax = 8.6%
ELA= 35.0%

Capital Cost for Tertiary Treatment designed for PDD

		FILTER CHEMICAL FEED SYSTEM	FILTER FEED PUMPS				FILTERS			CHLORINATION SYSTEM				CHLORINE TANK			Contingency, Tax, Engineering, Admin.							After
Project	Plant capacity MGD	Alum/polymer feed syst. constr cost, $	Friction head loss, ft	static head ft	TDH ft	Base pump sta. constr, $	Filter loading rate gpm/sf	Filter surface area, sf	Base filter constr. cost, $	Chlorine dosage, mg/l	Chlorine peak use, lbs/day	Cl system base constr cost, $	Cl system cost w/UFC upgrade, $	Cl tank det. time, min	Cl tank vol, cf	Cl tank base constr cost, $	base project constr cost, $	Contin-gency 25%, $	Mob/ Demob, 10%, $	Sales tax 8.6%, $	Total constr cost,$	Engr/Admin /Legal, 35 %, $	Total Project Cost, $	ENR Cost Indexation[a,b] 2000
Future Regional WWTP	5.85	720,000	10	20	30	243,000	3.5	1161	2,897,000	5	244	88,000	176,000	35	19,005	247,000	4,283,000	1,070,750	0	460,423	5,814,173	2,034,960	7,849,133	$ 9,678,000

TABLE 3

ANNUAL O&M COSTS

Project	Peak Day Flow MGD	Total Piping L (ft)	ANNUAL PUMPING STATION OR FACILITY (ASR, Storage) O&M COSTS[a]													ANNUAL PIPELINE O&M		ANNUAL WATER PURCHASE COSTS			Total annual distribution system O&M costs, 2000 $/year
			Total facility construction costs, $	annual facility maintenance costs, 1995 US$	TDH ft	overall pump efficiency, %	annual power req's @ peak day flow, kw-hr	annual pump usage, %[a]	actual annual power req's, kw-hr	cost per kw-hr, $	annual pump power cost, 1995 US$	peak flow annual labor req's, hrs	actual annual labor, hrs[a]	labor cost $/hr	annual pump O&M labor cost, $	Total annual pump O&M costs, $	Total pipeline construction costs, $	annual pipe maintenance costs, 1995 US$	Total Water Vol. Purchased MG	Winter water rates $/100 ccf	Total annual ASR water costs, $	
Reclaimed water from proposed future regional wastewater treatement plant																					
Distribution Portion - Option 1	5.85	74,400	1,538,231	7,691	388	75%	3,470,713	42%	1,447,287	0.034	49,302	720	300	55.50	16,650	73,643	7,733,570	38,668				
Distribution Portion - Option 2	5.85	77,900	1,538,231	7,691	150	75%	1,337,848	42%	557,882	0.034	19,004	720	300	55.50	16,650	43,346	8,201,170	41,006				138,000
Distribution Portion - Option 3	5.85	181,300	1,538,231	7,691	361	75%	3,228,362	42%	1,346,227	0.034	45,859	720	300	55.50	16,650	70,201	11,367,490	56,837				104,000
																						157,000

a. Assumes irrigation operations 5 months/year

TABLE X
ANNUAL O&M COSTS FOR TERTIARY TREATMENT

Project	Average capacity MGD	ALUM CHEMICAL COSTS[a]						POLYMER CHEMICAL COSTS[a]						ALUM/POLYMER FEED SYSTEM POWER				ALUM/POLYMER O&M		TOTAL	FILTER O&M		FILTER LABOR[a]					FILTER POWER			TOTAL		
		Alum dosage, mg/l	Alum use, lbs/day	Annual use, %	Annual vol, tons	Alum cost, $/ton	Annual alum cost, $	Polymer dosage, mg/l	Polymer use, lbs/day	Annual use, %	Annual vol, tons	Polymer cost, $/ton	Annual Polymer cost, $	alum/polymer feed power req's, hp	annual power req's kw-hr	cost per kw-hr, $	annual pump power cost, $	Alum/polymer feed syst. const cost,$	O&M costs, $	ALUM/ POLYMER O&M, $	Total Filter const cost, $	O&M costs, $	Filter labor, hrs/year	annual usage %	actual annual labor, hrs	labor cost $/hr	annual Filter labor cost, $	Filter power use, kwh/year	cost per kw-hr, $	annual Filter power, $	FILTER O&M COST, $	Filter TDH, ft	overall pump efficiency, %
North End Plant	3.784	150	4737	42%	361	140	50,471	0.5	15.79	42%	1.20	4,000	4,807	2.5	16,286	0.034	554	720,536	3,603	59,434	3,932,750	19,664	3,500	42%	1,460	45	65,678	378,400	0.034	12,866	98,207	30	75%

a. Assumes irrigation operations 5 months/year.

FILTER FEED PUMP POWER[a]					FILTER FEED PUMP LABOR[a]					FILTER FEED O&M		TOTAL	CHLORINE FEED SYSTEM O&M					CHLORINE FEED SYSTEM LABOR[a]					CHLORINE CHEMICAL COSTS[a]						CONTACT TANK		TOTAL	TOTAL	After
annual power req's @ peak flow, kw-h	annual pump usage, %	actual annual power req's, kw-hr	cost per kw-hr, $	annual pump power cost, $	peak flow annual labor req's, hrs	annual usage %	actual annual labor, hrs	labor cost $/hr	annual pump O&M labor cost, $	Total feed pumps constr cost, $	O&M costs, $	FILTER FEED SYST O&M, $	CI system cost w/UFC upgrade, $	O&M costs, $	CI system power use, kwh/year	cost per kw-hr, $	annual CI syst power, $	CI system labor, hrs/year	annual usage %	actual annual labor, hrs	labor cost $/hr	annual CI system labor cost, $	Chlorine dosage, mg/l	Chlorine peak use, lbs/day	Annual use, %	Annual vol, tons	Chlorine cost, $/ton	Annual Chlorine cost, $	Total CI tank cost, $	O&M costs, $	CHLORINE SYST O&M, $	CLASS A SYSTEM O&M, 1995$	ENR Cost Indexation **
173,537	42%	72,365	0.034	2,460	650	42%	271	45	12,197	386,888	1,934	16,592	238,000	1,190	16,000	0.034	544	950	42%	396	45	17,827	5	157.90	42%	12.02	200	2,403	335,000	1,675	23,639	197,872	$ 244,000

a. Assumes irrigation operations 5 months/year.

RECLAIMED WATER FROM PROPOSED FUTURE REGIONAL WASTEWATER TREATMENT PLANT [1]

CALCULATION OF LEVELIZED UNIT COSTS - NO REPLACEMENT

Design Flow =	5.85	Discount Rate =	3%
Average Flow, MGD =	3.784	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	181,300	Life Cycle, years =	35
		Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[c]								
Year	Distribution	Tertiary	Secondary	Total	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000 $	Annual Cash Flow, P.Worth, 2000	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual Unit cost, $/CCF
1	21,481,016	9,678,000		31,159,016				0%	0				2,212,516	31,159,016	31,159,016	0	2,148,074	N.A.
2					157,000	244,000		50%	200,500				2,212,516	200,500	188,990	387,029	2,286,009	5.9
3					157,000	244,000		100%	401,000				2,212,516	401,000	366,972	774,059	2,425,766	3.1
4					157,000	244,000		100%	401,000				2,212,516	401,000	356,283	774,059	2,366,792	3.1
5					157,000	244,000		100%	401,000				2,212,516	401,000	345,906	774,059	2,309,536	3.0
6					157,000	244,000		100%	401,000				2,212,516	401,000	335,831	774,059	2,253,948	2.9
7					157,000	244,000		100%	401,000				2,212,516	401,000	326,050	774,059	2,199,978	2.8
8					157,000	244,000		100%	401,000				2,212,516	401,000	316,553	774,059	2,147,581	2.8
9					157,000	244,000		100%	401,000				2,212,516	401,000	307,333	774,059	2,096,710	2.7
10					157,000	244,000		100%	401,000				2,212,516	401,000	298,382	774,059	2,047,320	2.6
11					157,000	244,000		100%	401,000				2,212,516	401,000	289,691	774,059	1,999,369	2.6
12					157,000	244,000		100%	401,000				2,212,516	401,000	281,253	774,059	1,952,815	2.5
13					157,000	244,000		100%	401,000				2,212,516	401,000	273,061	774,059	1,907,616	2.5
14					157,000	244,000		100%	401,000				2,212,516	401,000	265,108	774,059	1,863,734	2.4
15					157,000	244,000		100%	401,000				2,212,516	401,000	257,387	774,059	1,821,130	2.4
16					157,000	244,000		100%	401,000				2,212,516	401,000	249,890	774,059	1,779,767	2.3
17					157,000	244,000		100%	401,000				2,212,516	401,000	242,612	774,059	1,739,609	2.2
18					157,000	244,000		100%	401,000				2,212,516	401,000	235,545	774,059	1,700,620	2.2
19					157,000	244,000		100%	401,000				2,212,516	401,000	228,685	774,059	1,662,767	2.1
20					157,000	244,000		100%	401,000				2,212,516	401,000	222,024	774,059	1,626,017	2.1
21					157,000	244,000		100%	401,000				2,212,516	401,000	215,557	774,059	1,590,337	2.1
22					157,000	244,000		100%	401,000				2,212,516	401,000	209,279	774,059	1,555,696	2.0
23					157,000	244,000		100%	401,000				2,212,516	401,000	203,183	774,059	1,522,064	2.0
24					157,000	244,000		100%	401,000				2,212,516	401,000	197,265	774,059	1,489,411	1.9
25					157,000	244,000		100%	401,000				2,212,516	401,000	191,520	774,059	1,457,710	1.9
26					157,000	244,000		100%	401,000				2,212,516	401,000	185,942	774,059	1,426,932	1.8
27					157,000	244,000		100%	401,000				2,212,516	401,000	180,526	774,059	1,397,051	1.8
28					157,000	244,000		100%	401,000				2,212,516	401,000	175,268	774,059	1,368,040	1.8
29					157,000	244,000		100%	401,000				2,212,516	401,000	170,163	774,059	1,339,873	1.7
30					157,000	244,000		100%	401,000				2,212,516	401,000	165,207	774,059	1,312,527	1.7
31					157,000	244,000		100%	401,000				2,212,516	401,000	160,395	774,059	1,285,978	1.7
32					157,000	244,000		100%	401,000				2,212,516	401,000	155,723	774,059	1,260,202	1.6
33					157,000	244,000		100%	401,000				2,212,516	401,000	151,188	774,059	1,235,177	1.6
34					157,000	244,000		100%	401,000				2,212,516	401,000	146,784	774,059	1,210,880	1.6
35					157,000	244,000		100%	401,000	(9,165,233)	(2,580,800)	0	2,212,516	(11,345,033)	(4,031,837)	774,059	(2,987,054)	(3.9)
													Total:		35,022,735	25,930,971	56,799,983	
																	Levelized Unit Cost in 2000 $, $/ccf:	2.19

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.

RECLAIMED WATER FROM PROPOSED FUTURE REGIONAL WASTEWATER TREATMENT PLANT [f]

CALCULATION OF LEVELIZED UNIT COSTS - NO REPLACEMENT

Design Flow =	5.85	Discount Rate =	3%
Average Flow, MGD =	3.784	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	77,900	Life Cycle, years =	35
		Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[c]								
Year	Distribution	Tertiary	Secondary	Total	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000	Annual Cash Flow, Present Worth, 2000	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual Unit cost, $/CCF
1	16,210,813	9,678,000		25,888,813				0%	0				1,838,294	25,888,813	25,888,813	0	1,784,751	N.A.
2					104,000	244,000		50%	174,000				1,838,294	174,000	164,012	387,029	1,906,768	4.9
3					104,000	244,000		100%	348,000				1,838,294	348,000	318,469	774,059	2,030,299	2.6
4					104,000	244,000		100%	348,000				1,838,294	348,000	309,193	774,059	1,981,300	2.6
5					104,000	244,000		100%	348,000				1,838,294	348,000	300,188	774,059	1,933,728	2.5
6					104,000	244,000		100%	348,000				1,838,294	348,000	291,445	774,059	1,887,542	2.4
7					104,000	244,000		100%	348,000				1,838,294	348,000	282,956	774,059	1,842,701	2.4
8					104,000	244,000		100%	348,000				1,838,294	348,000	274,714	774,059	1,799,166	2.3
9					104,000	244,000		100%	348,000				1,838,294	348,000	266,713	774,059	1,756,899	2.3
10					104,000	244,000		100%	348,000				1,838,294	348,000	258,945	774,059	1,715,863	2.2
11					104,000	244,000		100%	348,000				1,838,294	348,000	251,403	774,059	1,676,023	2.2
12					104,000	244,000		100%	348,000				1,838,294	348,000	244,080	774,059	1,637,342	2.1
13					104,000	244,000		100%	348,000				1,838,294	348,000	236,971	774,059	1,599,789	2.1
14					104,000	244,000		100%	348,000				1,838,294	348,000	230,069	774,059	1,563,329	2.0
15					104,000	244,000		100%	348,000				1,838,294	348,000	223,368	774,059	1,527,931	2.0
16					104,000	244,000		100%	348,000				1,838,294	348,000	216,862	774,059	1,493,564	1.9
17					104,000	244,000		100%	348,000				1,838,294	348,000	210,546	774,059	1,460,198	1.9
18					104,000	244,000		100%	348,000				1,838,294	348,000	204,413	774,059	1,427,804	1.8
19					104,000	244,000		100%	348,000				1,838,294	348,000	198,460	774,059	1,396,353	1.8
20					104,000	244,000		100%	348,000				1,838,294	348,000	192,679	774,059	1,365,819	1.8
21					104,000	244,000		100%	348,000				1,838,294	348,000	187,067	774,059	1,336,173	1.7
22					104,000	244,000		100%	348,000				1,838,294	348,000	181,619	774,059	1,307,392	1.7
23					104,000	244,000		100%	348,000				1,838,294	348,000	176,329	774,059	1,279,448	1.7
24					104,000	244,000		100%	348,000				1,838,294	348,000	171,193	774,059	1,252,319	1.6
25					104,000	244,000		100%	348,000				1,838,294	348,000	166,207	774,059	1,225,979	1.6
26					104,000	244,000		100%	348,000				1,838,294	348,000	161,366	774,059	1,200,407	1.6
27					104,000	244,000		100%	348,000				1,838,294	348,000	156,666	774,059	1,175,580	1.5
28					104,000	244,000		100%	348,000				1,838,294	348,000	152,103	774,059	1,151,475	1.5
29					104,000	244,000		100%	348,000				1,838,294	348,000	147,673	774,059	1,128,073	1.5
30					104,000	244,000		100%	348,000				1,838,294	348,000	143,371	774,059	1,105,353	1.4
31					104,000	244,000		100%	348,000				1,838,294	348,000	139,196	774,059	1,083,294	1.4
32					104,000	244,000		100%	348,000				1,838,294	348,000	135,141	774,059	1,061,878	1.4
33					104,000	244,000		100%	348,000				1,838,294	348,000	131,205	774,059	1,041,085	1.3
34					104,000	244,000		100%	348,000				1,838,294	348,000	127,384	774,059	1,020,898	1.3
35					104,000	244,000		100%	348,000	(6,916,613)	(2,580,800)	0	1,838,294	(9,149,413)	(3,251,550)	774,059	(2,373,924)	(3.1)
													Total:		29,489,266	25,930,971	47,782,599	
															Levelized Unit Cost in 2000 $, $/ccf:			1.84

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.

RECLAIMED WATER FROM PROPOSED FUTURE REGIONAL WASTEWATER TREATMENT PLANT[f]

CALCULATION OF LEVELIZED UNIT COSTS - NO REPLACEMENT

Design Flow =	5.85	Discount Rate =	3%
Average Flow, MGD =	3.784	Interest Rate for Debt Service =	6.25%
Distribution Length, ft =	74,400	Life Cycle, years =	35
		Irrigation period, months/yr =	5

	CAPITAL COSTS, 2000 $[a]				O&M COSTS, 2000 $					Salvage Value, 2000 $[c]								
Year	Distribution	Tertiary	Secondary	Total	Distribution	Tertiary	Secondary	Operating capacity	Total O&M costs, 2000 $	Distribution	Tertiary	Secondary	Annualized Debt Service, 2000 $[b]	Annual Cash Flow, 2000$	Annual Cash Flow P.Worth, 2000 $	CCF produced per Year	Equiv. Annual Costs, 2000 $	Annual unit cost, $/CCf
1	15,432,512	9,678,000		25,110,512				0%	0				1,783,029	25,110,512	25,110,512	0	1,731,096	N.A.
2					138,000	244,000		50%	191,000				1,783,029	191,000	180,036	387,029	1,871,676	4.8
3					138,000	244,000		100%	382,000				1,783,029	382,000	349,584	774,059	2,013,724	2.6
4					138,000	244,000		100%	382,000				1,783,029	382,000	339,402	774,059	1,966,198	2.5
5					138,000	244,000		100%	382,000				1,783,029	382,000	329,517	774,059	1,920,056	2.5
6					138,000	244,000		100%	382,000				1,783,029	382,000	319,919	774,059	1,875,259	2.4
7					138,000	244,000		100%	382,000				1,783,029	382,000	310,601	774,059	1,831,766	2.4
8					138,000	244,000		100%	382,000				1,783,029	382,000	301,554	774,059	1,789,539	2.3
9					138,000	244,000		100%	382,000				1,783,029	382,000	292,771	774,059	1,748,543	2.3
10					138,000	244,000		100%	382,000				1,783,029	382,000	284,244	774,059	1,708,741	2.2
11					138,000	244,000		100%	382,000				1,783,029	382,000	275,965	774,059	1,670,098	2.2
12					138,000	244,000		100%	382,000				1,783,029	382,000	267,927	774,059	1,632,581	2.1
13					138,000	244,000		100%	382,000				1,783,029	382,000	260,123	774,059	1,596,156	2.1
14					138,000	244,000		100%	382,000				1,783,029	382,000	252,547	774,059	1,560,792	2.0
15					138,000	244,000		100%	382,000				1,783,029	382,000	245,191	774,059	1,526,458	2.0
16					138,000	244,000		100%	382,000				1,783,029	382,000	238,050	774,059	1,493,125	1.9
17					138,000	244,000		100%	382,000				1,783,029	382,000	231,116	774,059	1,460,762	1.9
18					138,000	244,000		100%	382,000				1,783,029	382,000	224,385	774,059	1,429,341	1.8
19					138,000	244,000		100%	382,000				1,783,029	382,000	217,849	774,059	1,398,836	1.8
20					138,000	244,000		100%	382,000				1,783,029	382,000	211,504	774,059	1,369,220	1.8
21					138,000	244,000		100%	382,000				1,783,029	382,000	205,344	774,059	1,340,466	1.7
22					138,000	244,000		100%	382,000				1,783,029	382,000	199,363	774,059	1,312,549	1.7
23					138,000	244,000		100%	382,000				1,783,029	382,000	193,556	774,059	1,285,446	1.7
24					138,000	244,000		100%	382,000				1,783,029	382,000	187,919	774,059	1,259,132	1.6
25					138,000	244,000		100%	382,000				1,783,029	382,000	182,445	774,059	1,233,584	1.6
26					138,000	244,000		100%	382,000				1,783,029	382,000	177,131	774,059	1,208,781	1.6
27					138,000	244,000		100%	382,000				1,783,029	382,000	171,972	774,059	1,184,700	1.5
28					138,000	244,000		100%	382,000				1,783,029	382,000	166,963	774,059	1,161,320	1.5
29					138,000	244,000		100%	382,000				1,783,029	382,000	162,100	774,059	1,138,622	1.5
30					138,000	244,000		100%	382,000				1,783,029	382,000	157,379	774,059	1,116,584	1.4
31					138,000	244,000		100%	382,000				1,783,029	382,000	152,795	774,059	1,095,189	1.4
32					138,000	244,000		100%	382,000				1,783,029	382,000	148,345	774,059	1,074,416	1.4
33					138,000	244,000		100%	382,000				1,783,029	382,000	144,024	774,059	1,054,249	1.4
34					138,000	244,000		100%	382,000				1,783,029	382,000	139,829	774,059	1,034,669	1.3
35					138,000	244,000		100%	382,000	(6,584,539)	(2,580,800)	0	1,783,029	(8,783,339)	(3,121,453)	774,059	(2,241,550)	(2.9)
													Total:		29,510,512	25,930,971	47,852,123	
																Levelized Unit Cost in 2000 $, $/ccf:		1.85

a. It is assumed that 80% of the distribution system facilities and 50% of the treatment facilities are considered static facilities with a 35 years useful life. To be consistent with the Regional Wastewater Services Plan (RWSP), replacement of non static facilities is assumed after 35 years of operation.

b. Assumes a 6.25% interest rate for annualized capital recovery with equal payments over 35 years.